ANNUAL CYCLE OF ^{13}C AND ^{15}N STABLE ISOTOPE SIGNATURES OF ADDUCTOR MUSCLE AT THE BIVALVE *PINNA NOBILIS*

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Abstract
Pinna nobilis are efficient filter feeders bivalves and provide evidence of surrounding conditions. Individuals of a Marine Protected Area (MPA) have been sampled and isotopic values of $\delta^{13}C$ and $\delta^{15}N$ have been analyzed to study the annual cycle of the fan mussel in non-eutrophic waters. Values obtained in summer months are higher indicating the need to consider temporal shifts in stable isotope linked with trophic resources availability.

Keywords: Bivalves, Coastal systems, Trophic relations, Balearic Islands

Introduction-Organism assimilate both carbon and nitrogen derived compounds from their food sources [1] giving isotopic signals which reflect surrounding water conditions. Isotopic values of $\delta^{15}N$ quantitatively asses trophic level, whereas values of $\delta^{13}C$ indicate relative contributions to the diet of different potential primary sources, giving evidence of inshore versus offshore food intake [2].Environmental differences such as light intensity and nutrient concentrations, species composition and geographic variability affect $\delta^{13}C$ and $\delta^{15}N$ values of primary producers in a region [3].Therefore, isotopic analysis is an effective method to study food webs [4].The aim was to study the annual cycle of the filter feeder *P. nobilis* at a MPA with stable isotope analyses of $\delta^{13}C$ and $\delta^{15}N$ and to contribute with new isotopic values to the existing library of such data.

Materials and Methods-The study was carried out at Cabrera, a MPA in the Balearic Islands (Western Mediterranean). Between five and ten individuals were monthly collected under licence from the Government for research purpose by experienced scuba divers from April 2011 to March 2012. Stable isotopes of $\delta^{13}C$ and $\delta^{15}N$ in muscle tissue of *P. nobilis* were analyzed following standard procedures [5]. A multivariate analyses of variance PERMANOVA tested significant spatial differences among months and season.

Results-Values of $\delta^{13}C$ were highest in August (-18.83 ± 0.00 ‰) and lowest in April and March (-19.81 ± 0.02 ‰ and -19.81 ± 0.00 ‰) (Fig.1). Values of $\delta^{15}N$ were highest in May (3.37 ± 0.00 ‰) and lowest in March (2.54 ± 0.00 ‰) (Fig. 2). Both isotopes showed significant differences between months (PERMANOVA, $P < 0.001$). Values of $\delta^{13}C$ and $\delta^{15}N$ were highest in summer, -19.16 ± 0.00 ‰ and 3.11 ± 0.00 ‰, respectively, and there were significant differences between seasons (PERMANOVA, $P < 0.001$).

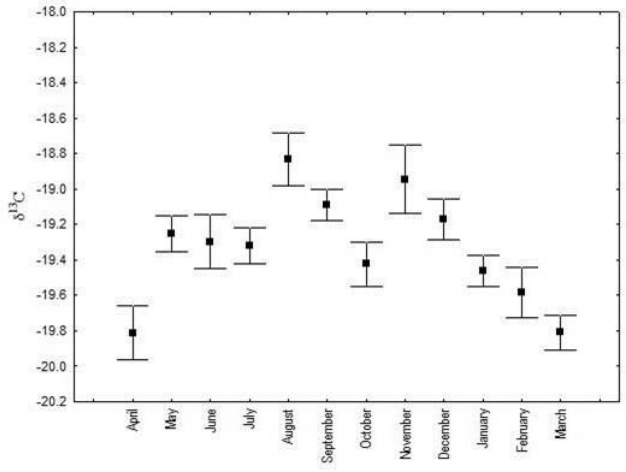

Fig. 1. Monthly mean ± Standard Error of isotopic signatures of $\delta^{13}C$ at muscle of *Pinna nobilis* in Cabrera.

Discussion-The fan mussel shows variation in isotopic composition of muscle among months and summer months are enriched in carbon and nitrogen. This variation suggests a change in inhabiting conditions and diet. The study contributes with new data and obtained results agree with available data from the literature for the same specie and sampling area.

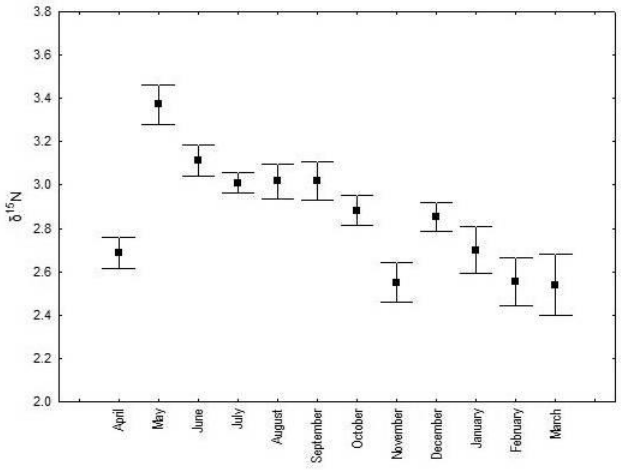

Fig. 2. Monthly mean ± Standard Error of isotopic signatures of $\delta^{15}N$ at muscle of *Pinna nobilis* in Cabrera.

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